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Customer Number

Patent
Case No.: 56109US011

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

First Named Inventor:	THOMPSON, DELTON R. JR.	
Application No.:	10/728555	Confirmation No.: 9972
Filed:	December 5, 2003	Group Art Unit
Title:	FIBROUS NONWOVEN WEBS	

BRIEF ON APPEAL

Mail Stop: Appeal Brief-Patents
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Sir:

This is an appeal from the Office Action mailed on September 1, 2006, in light of the Advisory Action mailed December 18, 2006, finally rejecting claims 1-10.

☐ Please charge the fee provided in 37 CFR § 41.20(b)(2) to Deposit Account No. 13-3723. One copy of this sheet marked duplicate is also enclosed.

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A Notice of Appeal in this application was mailed on December 21, 2006 and was received in the USPTO on December 21, 2006.

REAL PARTY IN INTEREST

The real party in interest is 3M Company (formerly known as Minnesota Mining and Manufacturing Company) of St. Paul, Minnesota and its affiliate 3M Innovative Properties Company of St. Paul, Minnesota.

RELATED APPEALS AND INTERFERENCES

Appellants are unaware of any related appeals or interferences.

STATUS OF CLAIMS

Claims 1-10 are pending and all ten claims stand rejected.

STATUS OF AMENDMENTS

No amendments have been filed after the final rejection.

SUMMARY OF CLAIMED SUBJECT MATTER

The claims at issue concern a method for preparing a nonwoven meltblown PET-fiber-based web. The method comprises extruding molten polyethylene terephthalate (PET) polymer at a temperature of about 295 degrees C or less into a high velocity stream of air, the stream of air having a temperature of about 260 degrees C or less and a velocity of at least 100 meters per second sufficient to impart chain-extended crystallization to the PET fibers; and collecting the prepared PET fibers. This method is found to prepare a web with a long-sought strength, durability and dimensional stability.

GROUND OF REJECTION TO BE REVIEWED ON APPEAL**First Ground of Rejection**

Claims 1-3 stand rejected under 35 USC § 102(b) as purportedly anticipated by Buntin et al., U.S. Patent No. 3,849,241 (hereafter Buntin).

Second Ground of Rejection

Claims 1-10 stand rejected under 35 USC § 103(a) as purportedly unpatentable over various combinations of Buntin and one or more of Thompson et al., U.S. Patent No. 5,841,081 (Thompson '081), Thompson et al., U.S. Patent No. 5,958,322

(Thompson '322), and alleged admitted prior art from Application No. 09/716,790, Paper No. 7, December 12, 2002.

ARGUMENT

I. The rejections are based upon an incorrect reading of Buntin (Buntin et al., U.S. Patent No. 3,849,241)

All the rejections of applicants' claims are based upon an incorrect reading of Buntin. The misreading extends to several teachings in Buntin, but to provide a focus to the discussion, this brief will concentrate first on the mistaken contention by the examiner that Buntin "***teaches making melt blown non-woven webs by extruding PET at a temperature of 550 F (288 C)***" (emphasis added). This is a key contention on which all the rejections under both 35 USC 102 and 35 USC 103 depend. For application of the quoted statement against claims 1-3, see the Final Office Action, mailed September 1, 2006, paragraph bridging pages 2 and 3; for other claims, see the Final Office Action, page 4, first paragraph (claim 4); paragraph bridging pages 4 and 5 (claim 5); third full paragraph on page 6 (claims 8 and 9); second and third full paragraphs on page 7 (further rejection of claims 1-3); page 8, last paragraph (further rejection of claim 4); paragraph bridging pages 9 and 10 (further rejection of claims 5-7 and 10); and paragraph bridging pages 11 and 12 (further rejection of claims 8 and 9).

The above-quoted, bold-letter statement does not appear in Buntin, and the examiner does not explain where Buntin supports such a statement. Various portions of Buntin are cited as support (Final Office Action, page 3, lines 3 and 4), but none of these cited portions contains such a statement.

Presumably the examiner's position is derived from two paragraphs in Buntin, one called herein the "temperature-range" passage and found at column 3, lines 36-46, and a second, called herein the "polymer-list" passage, found in column 4, lines 34-42. But neither of these paragraphs, nor any other disclosure in Buntin, supports the quoted statement, as will be seen from the following discussion.

A. The relevant passages in Buntin do not support the examiner's above-quoted statement

Buntin, an early and long-obsolete patent about melt-blowing polymeric fibers, teaches that before melt-blowing a high-viscosity thermoplastic polymer, the polymer can be subjected to a "critically controlled degradation" until the polymer has a reduced viscosity (Buntin, column 2, lines 36-58); this step is said to allow the preparation of melt-blown webs that are "substantially completely free of shot" (column 2, line 59 through column 3, line 18). The controlled degradation is accomplished by heating the polymer, optionally in the presence of a free radical source compound, to elevated temperatures said to cause such degradation.

The "temperature-range" passage and "polymer-list" passage identified above can be summarized as follows:

The "temperature-range" passage

The "temperature-range" passage, column 3, lines 36-46, is directed to the temperature at which a polymer is treated to degrade it. The passage teaches first (lines 36-37) that,

Temperatures well above the melting point of the polymer are employed.

The paragraph continues by stating,

In the absence of free radical source compounds ... the high intrinsic viscosity resin suitably is subjected to a temperature within the range of from about 550° F. [about 288 ° C] to about 900° F., preferably from about 600° F. to about 750° F.

The length of the heating is said (lines 42-46) to be

for a period of time effective to cause the requisite extent of polymer degradation

The "polymer-list" passage

At column 4, lines 34-42, one column after the temperature-range passage, Buntin describes the polymers that may be used in his invention, stating:

The degraded fiber-forming thermoplastic resin ... is produced ... from thermoplastic polymer resins that are degradable ..., including polyamides, e.g., ... ; polyesters, e.g., poly(methymethacrylate) and poly(ethyleneterephthalate); polyvinyls, e.g., ... ; C3-C8 polyolefins, high density polyethylene, and mixtures thereof.

The one-word mention of polyethylene terephthalate (PET) in the just-quoted disclosure is the only mention of PET in the whole 26-column patent.

1. The examiner's position goes beyond the statements of the cited paragraphs - "within" does not mean "throughout"

Underlying the examiner's quoted statement that Buntin "teaches ... extruding PET at a temperature of 550 F (288 C)" is an understanding that PET can be degraded at any and all temperatures "from about 550° F. to about 900° F." How else can the examiner identify 550°F as the temperature for treatment of PET? The only basis for the examiner's choice is that 550°F lies within the range from about 550°F to about 900°F. On that same basis the examiner could just as well choose 700°F or 800°F or 900°F.

But the examiner's position is not a correct reading of Buntin's statement. Buntin states that the polymers being treated are to be treated at "a temperature within the range from about 550° F. to about 900° F." (emphasis added). Somewhere within the range 550°F to about 900°F, Buntin is saying, there is a temperature at which PET can be treated. But Buntin is not saying that PET can be treated at any and all temperatures within the stated range. Specifically, Buntin is not saying that PET can be treated at 550°F, as contended by the examiner.

2. Buntin's temperature range is a first condition, not a final prescription

Buntin's teaching that treatment is to be within a temperature range from about 550°F to about 900°F is only a first condition to be satisfied. The exact temperature for any polymer depends on further conditions.

One such further condition, according to Buntin, is that the treatment temperature must be "well above the melting point" of the treated polymer" (column 3, lines 36-37). In other words, the temperature of treatment must meet two conditions – it must be within Buntin's stated temperature range, AND it must be well above the melting point.

By itself, Buntin's identification of the temperature range "from about 550°F to about 900°F" is incomplete, only the first step in a teaching about treatment temperatures. This identification of a broad temperature range does not purport to

describe a specific temperature for treating a specific polymer. Further information – e.g., determining through experiment which temperature is sufficiently “well above the melting point” -- must be developed to know at what temperature the polymer is to be treated. The examiner’s contention that Buntin says to extrude PET at 550°F (288°C) is an expansion beyond what Buntin actually says, and a misreading of Buntin. This is a first reason why the rejections appealed from are incorrect.

II. Buntin lacks the enabling teaching about PET necessary to support the appealed rejections

The one-word mention of PET in a list of polymers does not enable practice of Buntin’s invention with PET. Even less does it enable practice of applicants’ claimed invention, which as discussed below, has an objective that is radically different from Buntin’s and does not involve Buntin’s application of heat for a length of time sufficient to degrade the polymer. A valid rejection of claims under 35 U.S.C. 102 or 103 requires that the prior art reference on which the rejection is based have an enabling teaching as to the asserted subject matter (MPEP 2121).

Among the teachings that would be necessary in Buntin to provide an enabling teaching of degrading and melt-blowing PET are:

- Actual demonstration of degrading PET. Does the chemically complex, phenol-containing, ester molecule in PET actually degrade to a lower viscosity form in the same way as the rather uniform hydrocarbon molecule of polypropylene degrades? It is notoriously well known that polymers of different chemistry have a different susceptibility to degradation. And in Buntin the degradation must occur in a specific way – to leave the polymer with a reduced viscosity but an ability to be melt-blown into useful fibers.
- Specific discussion and exemplification of the temperatures to which PET would be heated to degrade it. Given the unique chemistry of PET, it is certain that conditions tailored specifically to PET would be required to cause the appropriate degradation, assuming such degradation is possible.
- Discussion and exemplification of the length of time required to heat PET to degrade it.

- Discussion and exemplification of a free radical source effective with PET.

None of these teachings are present. There is no demonstration that PET actually is useful in the disclosed invention, and given the significant chemical differences between polypropylene and PET, the utility of PET is a serious question. Most importantly, there is no description of the conditions needed to practice the invention with PET. As to PET, Buntin is simply an invitation to experiment, attempting to find conditions at which PET might degrade into a useful lower viscosity form suitable for melt-blowing.

III. The examiner disregards crucial facts that contradict the rejections

A. The rejections focus on words, not substance.

An example of the superficial nature of the rejection is found on page 3, fifth paragraph headed “1 and 2),” where it is stated,

Buntin’s temperatures are specifically applicable to the polymers in Buntin.

The Examiner interprets the temperatures and polymers to be associated principally because they are taught for the same process.

The quoted statement is in response to applicants’ argument that, because polymers of different chemistry are known to degrade at different temperatures, so the single range stated by Buntin could not be intended to apply equally to all polymers; a particular polymer is necessarily treated at a limited set of temperatures within Buntin’s stated range. The examiner answers by saying Buntin has a list of polymers and a range of temperatures, and the simple listing of a polymer means that it can be treated at any temperature within the given range.

The examiner does not deny applicants’ assertion that different polymers necessarily would be treated at different temperatures. Rather the examiner says that fact is irrelevant. The only thing relevant is that the word PET appears in a list of resins and the patent teaches a range of temperatures for treatment. The co-presence of PET and a temperature range is sufficient, according to the examiner, without any detailed look at the real-world meaning conveyed by the words.

Similarly, on page 5 of the Final Office Action, paragraph 5, it is said, “Thus, the process parameters of Buntin’s invention are to select one of the polymer resins listed at col. 4, lines 31-49.” The quoted statement is in reply to applicants’ argument that Buntin gives no enabling teaching about PET. The examiner’s answer is that PET is a listed resin, and that’s enough. Whether the patent is enabling as to PET is apparently irrelevant. The examiner understands Buntin as saying that any of the listed resins can be processed at the range of temperatures stated in column 3, lines 40-44 (an erroneous reading, as discussed above), and, according to the examiner, the simple appearance of PET on the list justifies a rejection under 35 USC 102.

B. Pertinent prior art contradicts the examiner’s erroneous reading of Buntin

Meyer et al., U. S. Patent No. 5,141,699 (copy of record), is directed to a technique for preparing melt-blown fibers, particularly in an oriented form. In the course of teaching oriented melt-blown fibers, Meyer also teaches the conventional preparation of melt-blown PET. Example 3 of the patent is a fully described process for melt-blowing PET. It teaches melt-blowing PET at temperatures of 315°C with an orienting chamber, or 335°C without an orienting chamber (the comparative example). The comparative example, without an orienting chamber, is in effect the conventional practice in melt-blowing PET.

Meyer issued in 1992, almost twenty years after Buntin, and is the most recent evidence of record showing conventional practice in melt-blowing PET. There is no art of record demonstrating melt-blowing of PET at a temperature lower than 315°C.

Meyer first of all indicates that PET would not be degraded at the examiner’s chosen 288°C. Both the 315°C and 335°C temperatures used in Meyer to melt-blow PET are well in excess of the 288 °C temperature selected by the examiner, and Meyer reveals no degradation occurring at those temperatures.

Meyer also confirms the novelty of applicants’ invention. Both of the 315°C and 335°C temperatures used by Meyer for melt-blowing PET are well in excess of the 295°C called for in applicants’ claims. On the art of record, applicants’ use of 295°C or less to melt-blow PET is novel and unsuggested.

C. The rejection violates Buntin's requirement that the treatment temperature be "well above the melting point" of PET

As noted, Buntin states that the temperature of treatment is to be "well above the melting point" of the treated polymer" (column 3, lines 36-37). The need for high temperatures follows from the fact that the goal of the treatment is to degrade the polymer, breaking it up into a lower-viscosity form.

Buntin's working examples are the only indication in Buntin as to what is meant by "well above the melting point." Two polymers – polypropylene and poly-4-methylpentene-1 – are exemplified in Buntin's examples, and they have melting points as follows:

Polypropylene	160-170° C
Poly-4-methylpentene-1	240° C

(see the *Encyclopedia of Polymer Chemistry*, volume 8, page 26, copy attached to applicants' Response filed November 16, 2006 as Attachment N).

In Buntin's working examples polypropylene is always heated to a temperature above 580° F (about 304° C) and poly-4-methylpentene-1 is always heated above 620° F (about 326° C) for poly-4-methylpentene-1. That means the treatment temperatures for poly-4-methylpentene-1 are above the melting point of poly-4-methylpentene-1 by at least 86°C, and the treatment temperatures for polypropylene are above the melting point of polypropylene by at least 134 to 144°C. In fact, most of Buntin's polypropylene working examples use treatment temperatures of at least 600° F (about 316°C), which is nearly 150°C above the melting point of polypropylene.

These temperature differences above melting point – 86°C to 150°C -- provide an indication as to what Buntin means by "well above the melting point." Buntin uses high temperatures, substantially above the melting point, because polymers normally do not degrade at the melting point, and a much higher temperature is needed in order to degrade the polymer.

PET has a melting point of about 250-260°C (see Volume 8, page 26 of the *Encyclopedia of Polymer Chemistry*; Attachment N). Adding 86°C, Buntin's smallest elevation above melting point, to PET's melting point would make the treatment temperature to degrade PET at least 336-346° C. More typically, the working examples in Buntin would suggest increases above melting point of at least 150° C above the

melting point, meaning a treatment temperature to degrade PET of at least 400-410° C. Whether even such temperatures would be adequate would require added information beyond any information available from Buntin, e.g., separate experimental testing.

At a minimum, the temperatures indicated by Buntin's teachings, extrapolated to PET, are far above the 295° C called for in applicants' broadest claim. On this ground alone, Buntin does not anticipate applicants' invention.

IV. The combination of steps in applicants' method is even more remote from Buntin

The above discussion has focused on the recitation in applicants' claims calling for extruding PET polymer having a temperature of about 295°C or less; but applicants' claims also recite that the stream of air into which the polymer is extruded has a manifold air temperature of about 260°C or less. To deal with this added recitation of air temperature the examiner cites Buntin, column 7, lines 59-64, which states that the air temperature of the air stream into which the polymer is extruded "may vary from 500°F to 900°F." The recited 500°F is equal to 260°C, and the examiner argues that Buntin teaches "extruding PET at a temperature of 550 F (288 C) ... with a stream of air at 500 F (260 C), which reads on the claimed range of less than about 260 C given the range implied by 'about' " (Final Office Action, paragraph bridging pages 2 and 3).

In other words, the examiner takes the bottom temperature of the 550°F to 900°F range for treatment temperature and combines that with the bottom temperature of the 500°F to 900°F range for air temperature. As discussed above, there is no basis for taking the 550°F temperature for PET; and there is also no basis for taking the 500°F air temperature. Even more remote is any basis for taking the combination of the lowest treatment temperature with the lowest air temperature.

Applicants combine a low extrusion temperature with a low air temperature to induce work in the extruded fibers leading to chain-extended crystallization. But Buntin is interested in high temperatures to achieve degradation. As to air temperature Buntin states that the air temperature is "usually ... slightly higher, about 50°F., than nozzle die temperatures" (Buntin, column 7, lines 62-64), while nozzle temperatures are said to be in the range from about 550°F to 900°F (Buntin, column 9, lines 16-18), meaning a leading away from 500°F for air temperature. More than that, there again is no basis for choosing any particular temperature for PET. The examiner's choice is

completely arbitrary, and is selected using applicants' claims as a guide rather than any internal teaching in Buntin leading to the combination of an extrusion temperature of 288°C and an air temperature of 260°C.

V. Buntin's method of *degrading* does not anticipate or suggest applicants' method of *melt-blowing*

Buntin's temperature range "from about 550° F. to about 900° F." relied on in the rejection is part of a teaching about degrading a polymer, a separate step that Buntin uses before the step of melt-blowing the polymer. The whole paragraph in Buntin in which the temperature range appears is directed to "approaches to bring about the extent of polymer degradation requisite to practice of this invention" (column 3, lines 34-36). To achieve degradation the polymer resin being degraded "is subjected to a temperature within the range from about 550° F. to about 900° F. ... for a period of time effective to cause the requisite extent of resin degradation" (column 3, lines 40-44). The temperature range is thus chosen for its purpose of causing polymer degradation, not polymer melt-blowing.

Applicants' purpose is completely different from Buntin's purpose. Applicants' purpose is to prepare melt-blown PET fibers with a more fully developed molecular structure, that is, with a chain-extended crystal structure. To do that, applicants teach use of a *low* extrusion temperature. As stated in applicants' specification, page 10, lines 5-14, the temperature of the polymer in the die cavity (from which it is extruded) "is held to a temperature less than about 35°C higher than the melting point ... [and] preferably ... no more than about 20°C higher than the melting point" (see applicants' specification, page 10, lines 5-14). Also, applicants extrude the polymer into an air stream that has a low temperature.

Applicants advanced the art by achieving a dimensionally stable nonwoven web of PET melt-blown fibers. Others had tried different approaches to dimensionally stabilize meltblown webs of PET fibers, but no successful product had been obtained; see applicants' specification, page 2, line 17, to page 3, line 21. But applicants achieved this result directly in the production of the melt-blowing process. The fact that many efforts had been made to achieve such a result is evidence that applicants' invention was not obvious.

Buntin has absolutely nothing to do with preparing dimensionally stable PET fibers, and Buntin offers not a hint leading to the successful preparation of such fibers and webs made from such fibers. Applicants have made a major advance in the art and Buntin in no way leads to that advance.

CONCLUSION

For the foregoing reasons, appellants respectfully submit that the rejections stated in the Final Office Action of September 1, 2006, maintained in the Advisory Action mailed December 18, 2006 are in error and should be reversed on all counts.

Respectfully submitted,

February 12, 2007

Date

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CLAIMS APPENDIX

1. A method for preparing a nonwoven meltblown PET-fiber-based web comprising a) extruding molten PET polymer having a temperature of about 295 degrees C or less through the orifices of a meltblowing die into a high-velocity stream of air to produce a mass of PET fibers, the stream of air having a manifold air temperature of about 260 degrees C or less and an air velocity of at least 100 meters per second sufficient to impart chain-extended crystallization to the PET fibers; and b) collecting the prepared PET fibers.

2. A method of claim 1 in which the PET fibers are prepared from resin exhibiting an intrinsic viscosity of between about 0.45 and 0.75.

3. A method of claim 1 in which the prepared PET fibers exhibit a double melting peak on a DSC plot which is representative of a first molecular portion within the fiber that comprises a non-chain-extended crystalline phase, and a second molecular portion within the fiber that comprises a chain-extended crystalline phase and melts at an elevated temperature over that of the non-chain-extended crystalline phase.

4. A method of claim 1 in which other fibers or particles are dispersed among the PET fibers before they are collected.

5. A method for preparing a nonwoven meltblown PET-fiber-based web comprising a) heating PET polymer resin having an intrinsic viscosity of between about 0.45 and 0.6 to a molten form, extruding the molten PET polymer while at a temperature of about 285 degrees C or less through the orifices of a meltblowing die into a high-velocity stream of air to thereby prepare a mass of meltblown PET fibers having an average diameter of about 20 micrometers or less, the stream of air having a temperature of less than about 270 degrees C and an air velocity of at least 100 meters per second sufficient to impart chain-extended crystallization to the PET fibers; b) collecting the prepared PET fibers as a web; and c) passing the collected web through

an oven to anneal and autogenously bond the PET fibers together at points of fiber intersection.

6. A method of claim 5 in which the PET polymer has a temperature of about 275 degrees C or less when extruded through the orifices of the meltblowing die.

7. A method of claim 5 in which the stream of air has an air velocity of at least 150 meters per second.

8. A method of claim 5 which includes the further step of introducing additional fibers into the stream of prepared PET fibers before collecting the web of fibers.

9. A method of claim 8 in which the additional fibers comprise staple fibers.

10. A method of claim 5 in which at least one additional polymeric material is extruded through the orifices of the meltblowing die together with the PET polymer to thereby prepare bicomponent fibers.